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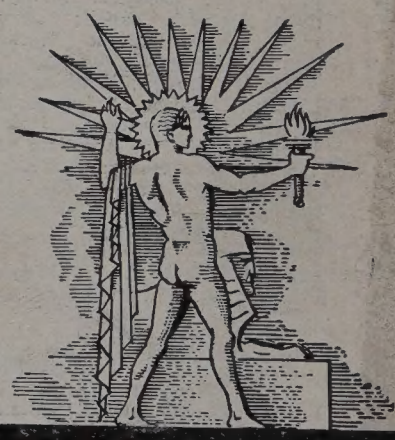
# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

Dr. Abbot Reads the Sun's Heat

See Page 99



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# SCIENCE NEWS LETTER

*Vol. XIX* *No. 513*

The Weekly Summary of Current Science

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*Edited by* WATSON DAVIS

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## DO YOU KNOW THAT

A rough diamond is so little different in appearance from a valueless pebble that an average observer would not recognize it.

A botanist points out that people who grow cactus plants in pots often fail to water them, forgetting that in the desert the cactus stores up water.

Growing ice crystals develop pressures as great as 199 pounds to the square inch.

A tuberculosis clinic that travels about on wheels in a truck is operated by the State Board of Health in Georgia.

The hair of the Ute Indian is very coarse, sometimes ten times the thickness of the hair of a white man.

Ice cream packed in "dry ice" recently made a 12-day journey from Seattle to Berlin.

The library of Rameses II at Thebes had an inscription over the doorway reading, "The Hospital of the Soul."

Plant breeders from Cornell University have been assisting the University of Nanking, China, in a five-year program of crop improvement looking toward a more adequate food supply in that country.

Bats can remain head-downward throughout an entire winter's sleep.

Many of our picturesque names for colors, such as pea-green, vermilion, chestnut, were brought into use by biologists to describe the colors of birds and flowers.

Onions and other groceries may soon be sold in "duplex" cotton bags, which are woven with open mesh on one side so that the customer may inspect the contents.

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*Science Service presents over the radio, an address*

**INDIANS OF THE DISTRICT OF COLUMBIA**

**By Dr. Walter Hough, head curator of anthropology at the United States National Museum in Washington**

**Friday, February 20, at 3:45 P. M., Eastern Standard Time**

*Over Stations of*

**The Columbia Broadcasting System**

METEOROLOGY-ASTRONOMY

# Small Changes of Sun's Heat Control Weather on Earth

## Revolution in Weather Forecasting Foreseen as Result Of Quarter Century Research by Smithsonian Secretary

**See Front Cover**

THE SUN when it radiates heat and light to the earth also broadcasts information that can be used to foretell the weather here on earth.

Dr. C. G. Abbot, secretary of the Smithsonian Institution, after more than two decades of solar observation, announced today through the medium of a scientific publication entitled "Weather Dominated by Solar Changes" that:

"Contrary to the prevailing view, the weather appears to be governed by variations in solar radiation."

His discovery seemingly presages a day when we shall be able to tell what the weather will be weeks, months and perhaps years in the future instead of just tomorrow as is now the case. Eventually the present method of forecasting from telegraphed weather data as performed twice daily by the U. S. Weather Bureau promises to become an auxiliary instead of a primary method of predicting weather.

Long-range weather forecasting, formerly the claim of charlatans and the dream of those of great faith and little knowledge, through Dr. Abbot's long program of research promises to become a scientific reality.

Dr. Abbot compared the temperatures as officially recorded at Washington, D. C. with the changes of intensities of the sun's radiation as found by daily measurements at the solar observing station of the Smithsonian located in Atacama desert on Mount Montezuma, Chile. Sometimes the solar radiation increases steadily for several days, at other times decreases similarly. Dr. Abbot finds that these opposing sorts of solar change produce opposite changes of weather, not only at Washington but at other United States stations.

Average changes of mean temperatures of five degrees Fahrenheit are found, Dr. Abbot reports, corresponding to solar changes averaging only eight-tenths of one per cent. Hence, he supposes that on many occasions temperature effects caused by solar changes may reach 10 degrees, and sometimes 15 and 20 degrees. This causes Dr. Abbot to claim:

### Dr. Abbot's Claims

"Major changes in weather are due to short period changes in the sun."

"So revolutionary is this conclusion for meteorology," Dr. Abbot declares in his report, "that I hesitated to publish it until the unanimous approval of many competent critics encouraged me. I am further supported in this view by having found a similar relationship prevailing not only at Washington, but at Williston, N. D., and Yuma, Ariz., in all months of the year."

Thus the relation between the sun and the weather has been tested in the coldest and hottest localities of the country as well as the nation's capital.

Dr. Abbot's studies show that the meteorological effects of solar variation are produced indirectly. The sun's rays do not act directly on the earth's atmosphere. Moreover, some of the large effects occur on earth 10 to 12 days and sometimes 16 to 17 days after the solar cause ceases to operate.

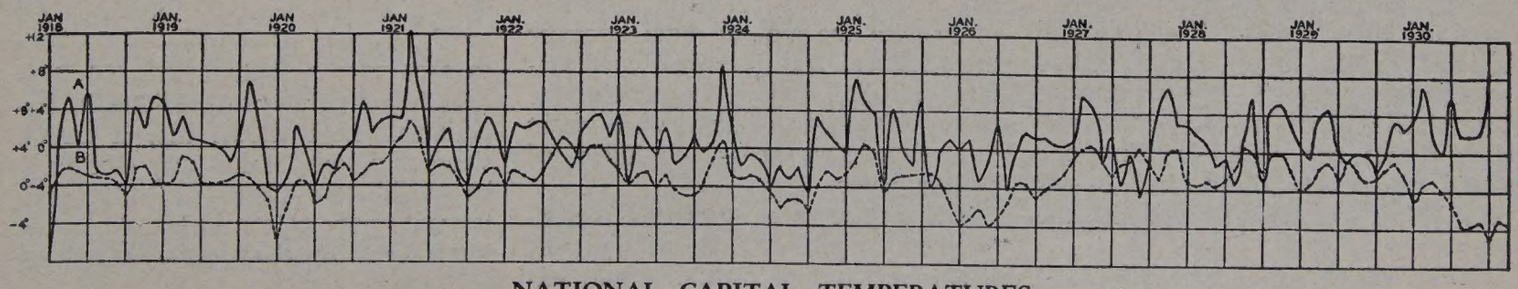
That the circulation of the atmosphere is changed by the sun's variations is Dr. Abbot's suggestion. The atmosphere absorbs a tenth of a quarter of the sun's radiation reaching earth, this tends to displace the centers of the great cyclonic whirls of the atmosphere, and as a consequence the wind direction at various places is changed. Since wind has much to do with temperature, this markedly alters the height of the thermometer. Dr. Abbot further suggests that the solar variations may be particularly effective at certain parts of the earth where weather is born and that the atmospheric wave drifting southeasterly from these centers are influenced to produce weather changes.

Long swings of variation in the sun's heat extending over many months were also discovered. These give promise of very long-range weather forecasting, for the seasons or even years in advance. These long-continuing changes in solar variation can be analyzed into five regularly recurring periodicities of cycles respectively of 68, 45, 25, 11 and 8 months which are submultiples of 11¼ and 33 years. This is interesting because these latter intervals have long been recognized as related to sunspots.

After discovering these five regular periodicities in the solar variation, Dr. Abbot then investigated long continuing temperature records for Washington, and discovered therein these same five regular periodicities. When he took these five periodicities and combined them into one curve he found that he had reproduced very closely the curve of actual Washington temperatures.

### Experimental Forecasts Desired

Associated with Dr. Abbot in the early phases of his researches as applied to the weather was H. H. Clayton of Canton, Mass., who formerly directed the Chilean weather service and used the Smithsonian Institution's daily values of the solar constant in weather forecasting in that South Amer-




**NATIONAL CAPITAL TEMPERATURES**

***Curve A gives the periodicities of Washington's mean monthly temperatures while curve B is a synthetic temperature curve as derived by Dr. Abbot by combining periods that he discovered in his solar radiation data.***

ican country some ten years ago. Since then he has further developed forecasting methods based on the solar constant values and applied them to sections of the United States.

Dr. Abbot has not yet actually made weather forecasts but he is hopeful that meteorologists will begin to make experimental forecasts using the facts that he has discovered. Mr. Clayton is now forecasting on the basis of the solar constant and has a commercial service with many paying clients.

*Science News Letter, February 14, 1931*

AERONAUTICS

# Congress Considers Measures For Trans-Oceanic Airship Lines

## Favorable Action on Merchant Marine Bill Would Hasten Mail and Passenger Service Across Atlantic and Pacific

BIG airships are occupying attention in Congress this session.

One proposition under consideration, is that of a trans-oceanic mail and passenger service which would deliver letters from the United States to Europe in two and one-half or three days from our eastern coast and to China in five or six days from the west coast.

The measure is the McNary-Parker Airship Merchant Marine Bill. It would legalize enormous airships as common carriers and would authorize the Postmaster General to make mail-carrying contracts at rates not to exceed $20 per mile.

Hearings on this bill before the House Interstate and Foreign Commerce Committee have been concluded for this session.

Airship terminals in America, Europe, Hawaii and the Orient would be built by companies established by business men prominent in the Goodyear Tire and Rubber Company and they would be used interchangeably by dirigibles of the different nations.

The first trans-oceanic project will probably be over the Pacific to Honolulu, with one round trip made weekly. Later this service would be extended to Manila and Japan. Honolulu would be reached in 36 hours instead of six or seven days, and Manila in six days instead of three weeks. The proposed airships would carry about 20,000 pounds of mail each. The sponsors of the Airship Merchant Marine measure declare that one airship making one round trip weekly, could carry 75 per cent. of all first-class mail to the Orient.

But it will be a long time before the trans-oceanic airships carry any large proportion of overseas passengers, even when as many as four Zeppelins are built for this service. Only about 8 per cent. of first-class passengers now traveling abroad could be accommodated in four 80-passenger ships, it has been estimated.

Another proposition, on which the two houses of Congress have not yet agreed, is that of providing for a big metal-clad airship for the Army. Tentative plans call for a $4,500,000 metal-clad ship, 554 feet long and 120 feet in diameter, and capable of running at a speed of 100 miles per hour.

Such a ship could be expected to transport a 40,000 pound military load from Washington to Panama in 28 hours; replacement airplanes could be carried from Florida to Panama, and similar military operations performed. The Detroit Aircraft Corporation is anxious to build the ship.

Interesting in connection with the transporting by air of mail across the Atlantic was the Postoffice Department's advertisement for bids for such airplane service in November, 1930. Subsequently the advertisement was withdrawn, but it will be reissued sometime this year. The Postoffice Department has been informed that there are some companies anxious to bid on it.

The route specified was to Bermuda, the Azores, and thence across the ocean to France, and of once per week frequency. Maximum rates to be paid were $2 per mile for the specified load of not exceeding 300 pounds, and $1 per pound per thousand miles or pro rata thereof for greater or less mileage for mails in excess of the specified load.

The Goodyear Company is now building two enormous dirigibles for the Navy at the huge airship dock in Akron, Ohio. One ship, the "Akron," will probably be delivered in June of this year, and the other at the end of 1932.

*Science News Letter, February 14, 1931*

PLANT PATHOLOGY

# Destructive Plant Disease Causes "Fever" in Leaves

ABNORMAL temperatures in sick plants, similar to fever in germ-afflicted animals, have been observed in the leaves of plants attacked by root rot, by Dr. Walter N. Ezekiel and Dr. J. J. Taubenhaus, Texas plant pathologists. They reported their finding before the fourth annual conference on root-rot investigations held at College Station, Texas. Their observations, made with the aid of both mercury thermometers and electrical temperature-measuring devices, showed that the leaves of afflicted plants were about three degrees warmer than those of healthy plants.

The disease that causes this "fever" symptom in plants is one of the most serious menaces to plant life now extant in this country, especially in the Southwest. There it has been especially harmful to cotton, though it attacks several hundreds of other species, including ornamental plants as well as agricultural crops. Its yearly damage in the state of Texas alone is estimated at $100,000,000.

Root rot is caused by a bacterium that is appropriately named *Phymatotrichum omnivorum,* for it does eat nearly everything. It lurks in the soil, so that once a field is infected it is next to impossible to eradicate it. Experiments have shown that it cannot stand acid soils, and it may eventually be possible to combat it by raising acid-tolerant crop plants and making the soil too acid for the bacteria yet not too acid for the crop.

*Science News Letter, February 14, 1931*

PHYSICS

# Electrons in Harness

## We Are in the Midst of a Revolution in Human Affairs Caused by the Increasing Use of the Vacuum Tube

By **O. H. CALDWELL, Editor of the magazine, Electronics, and former Federal Radio Commissioner.**

Editor's Note: This article has been given as a Science Service radio talk over a nation-wide network of the Columbia Broadcasting System. Other interesting talks on scientific subjects presented in popular language by men prominent in the various science fields are broadcast from stations of the Columbia system every Friday afternoon at 3:45 P. M., Eastern Standard Time.

THE past five years have been momentous ones in the history of the tiny electron and its prodigious influence on human affairs. But the five years ahead seem destined to bring even more revolutionizing influences into everyday life.

Since 1925 the electron tube, through radio broadcasting, has reconstructed American home life and home entertainment; it has brought us "sound movies," with doubled box-office receipts; it has linked together by telephony the continents of the antipodes; it has created bloodless surgery and healing artificial fevers; it has effected new control of power, motors, lights and heat; it has wrought miracles of might and of delicacy in every department of science.

And the next five years undoubtedly will witness even more sweeping advances of this electron host. Perhaps one of the most striking of these changes will be the development of new electronic light sources to replace our present electrical illuminants. Already electronic or gaseous signs are replacing the older incandescent-lamp displays, and saving two-thirds of the electricity consumed by the former signs. And now these same neon tubes and helium envelopes are being employed to light interiors, art galleries, homes and offices. Meanwhile new hot-cathode neon lamps are being developed in Europe and America, which may make possible new efficiencies of light, three to five times as economical as any we have today.

With the photoelectric cell or "electric eye," which is sensitive to light and darkness and through relays can operate switches, our factories, buildings, schools and homes will eventually all be lighted automatically at the approach of darkness. Our heating systems have thermostats that turn on the steam when the room gets chilly; why not "light-o-stats" that will turn on the lights when it gets dark?

The powers of radio broadcast stations will progressively increase, until even 500 kw. or 1000 kw., 10 to 20 times the power of the present largest station, will seem commonplace. Meanwhile our telephone and electric light wires will bring us broadcast music and entertainment, eliminating the fading, static and interference that seem to be inherent in ether broadcasting. Television will be an accomplished thing, but will come perhaps over wires. Probably even seeing across the Atlantic by cable will not be an impossibility.

### Aid for Astronomy

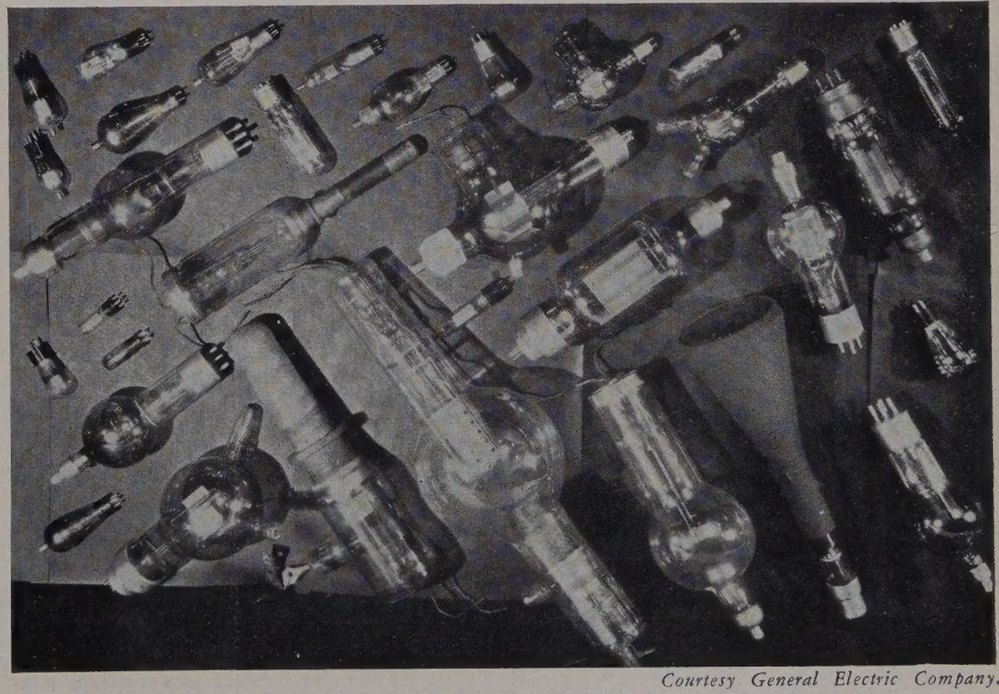
With our new electronic aids we shall be sounding the depths of the universe with new types of telescopes—simple, inexpensive, and much more powerful than the crude and massive monsters of modern observatories, which have had no fundamental technical improvement since Galileo. In the direction of the minute and infinitesimal, also, we shall undoubtedly extend our present scale of electronic measurements, which today can caliper a faint star and detect its transmitted heat, or can indicate electric current down to the one-quintillionth part of an ampere!

Our future movies—all talking, all in colors, and all "wide screen," will also have "binaural sound," that is double sound tracks, giving us true acoustic depth and reality as we listen to sounds from different sides of the picture!

Elaborate new musical instruments will employ either photo-cell sound tracks, or electronic-tube oscillators, combining frequencies to produce harmonies, timbres, and qualities sweeter than any product of our present-day instruments, which depend upon mere accidental vibrations of strings, hammers, cat gut, horse-hair, brass tubes.

Undoubtedly in the power field we shall be transmitting high-tension direct-current instead of alternating current, and thus increasing line efficiencies and capacities three- to six-fold. Tubes will convert from a.c. to d.c. for transmission, and thence "invert" to any desired alternating-current frequency best suited to the load. Tubes will replace high-tension switches, circuit breakers and lightning arresters. Within twice five years we may even be transmitting our energy over high-frequency radio beams in the ether, entirely without wires. Who can say no?

(*Turn to Next Page*)



*Courtesy General Electric Company.*

VACUUM TUBES OF MANY DIFFERENT TYPES

Airplanes may be taking their power supply from such beams of radiated energy, which will also guide them. This may sound the height of absurdity in February, 1931, and I would not seriously mention it here, were it not for the fact I have recently heard two of the sanest and most fruitful engineers in the country, each with world miracles to his credit, independently and confidentially propose the early possibility of this very thing!

Electron tubes will effect revolutionary changes in our food supplies. Tubes form the heart of our new therapeutic aids. Tubes will be major factors in eliminating certain diseases from the human family. We know already that tubes seem to effect hereditary changes and the creation of new species, and possibly they may even predetermine sex.

In fact the sweeping changes which the vacuum tube will effect upon the life of the human race within the next five years and the next few decades may very likely cause this century and period to be known as "The Electronic Age."

*Science News Letter, February 14, 1931*

CHEMISTRY-GEOLOGY

# Synthetic Petroleum Teaches About Oil Formation in Earth

## High Temperatures and Pressures, Alpha Rays and Electric Discharges Make Complicated Oil of Simple Hydrocarbons

A CLUE to the way in which the earth formed the riches of petroleum held within its crust has been made known by Dr. S. C. Lind, director of the School of Chemistry of the University of Minnesota.

The origin of oil is one of the major scientific mysteries of today. While oil supplies are overabundant to fill current demands of autos and the many other consuming needs of modern civilization, scientists have looked forward with fear to an oilless future when the oil of the earth is exhausted.

Dr. Lind explains that he and other chemists have found ways of making synthetic petroleum identical in complexity with the natural oil.

Starting with a simple hydrocarbon, such as the familiar methane or marsh gas, ordinary chemical actions at high temperatures and pressures are able to make synthetic petroleum. Dr. Lind found that the alpha rays of radium, which are speeding hearts of helium atoms, can also change simple hydrocarbons into highly complicated ones. Even electrical discharges produce the same effect.

Since the growth of the earth with its twistings of the rock layers and its immense pressures in the depths of its crust must have produced high heats and intense compressions, this suggests one way the natural petroleums could have been formed. Radium and radioactive compounds occur in the crust of the earth and they too might have been the means of making petroleum.

One question remains that is as yet unanswered. What was the raw material used by the earth in the manufacture of its petroleum. Was it vegetable, animal or inorganic? Is our gasoline distilled essence from the luxurious vegetation such as that which made our coal, or from the bodies of millions upon millions of minute animals of past ages. Or is it a synthesis from mere combinations of carbon and hydrogen that never were alive?

*Science News Letter, February 14, 1931*

BIOLOGY

## African Fish Dies If Kept Under Water

AN AFRICAN fish that must come to the surface to get air, just as a whale must come, and that will suffocate if kept under water where ordinary fish get along easily with their gills, is the astonishing creature described by Prof. Homer W. Smith of the University of Virginia. Prof. Smith has recently returned from Africa, where he collected a considerable number of these fish and brought them back alive to America.

The fish is known colloquially as a lungfish and technically as *Protopterus aethiopicus*. It lives in the shallow waters along the edges of central African lakes, that dry up during the rainless season, leaving the fish stranded. It burrows into the mud, curls up in a sort of cocoon, and sleeps through the hard times, maintaining connection with the world only through an air channel to the surface.

It is probable that its air-breathing habit has developed as an evolutionary necessity in response to this periodic crisis of waterlessness. At any rate, the fish now lose the use of their gills early in life, and depend for air on relatively simple lungs, coming to the surface every quarter-hour or so.

Prof. Smith found that fish prevented from coming to the surface by being kept down with a wire screen showed signs of great distress. They made more and more frequent attempts to swim to the top, fighting against the barrier and trying anxiously to find some way around its edge. After about an hour they would lose control of their movements, swimming on their sides or looping aimlessly about. In from two to eight hours they were dead of asphyxiation. If partially asphyxiated fish were released they eagerly sought the surface and remained there for longer than their usual breathing period, eagerly gulping air.

The full technical report of Prof. Smith's physiological studies on Protopterus is published in the current issue of *Ecology*.

*Science News Letter, February 14, 1931*

MILITARY SCIENCE

## New Type of Aerial Bomb Developed by Army

CAREFULLY guarded from the eyes of the curious, the U. S. War Department's chemical warfare service has been concentrating its experimental work in gas offensive on the development of a combination gas-high explosive aerial bomb.

During the World War gas was used with telling effect by the Germans, and towards the close of the war the U. S. Army chemists were pouring deadly fumes into the German defense, too. Gas attacks from airplanes, however, are strictly a post-war development.

Army chemists consider the perfection of a bomb, which when dropped from the air will spread a gas blanket over the surrounding terrain, to be one of their most important jobs.

Efforts are also being made to cut down the weight of gas masks, and new types which are safer and permit more

activity on the part of the wearer are being produced. American gas masks are the best in the world, Major General H. L. Gilchrist, chief of the Chemical Warfare Service, believes but he thinks that their weight and bulk are "still greater for foot troops than is desirable."

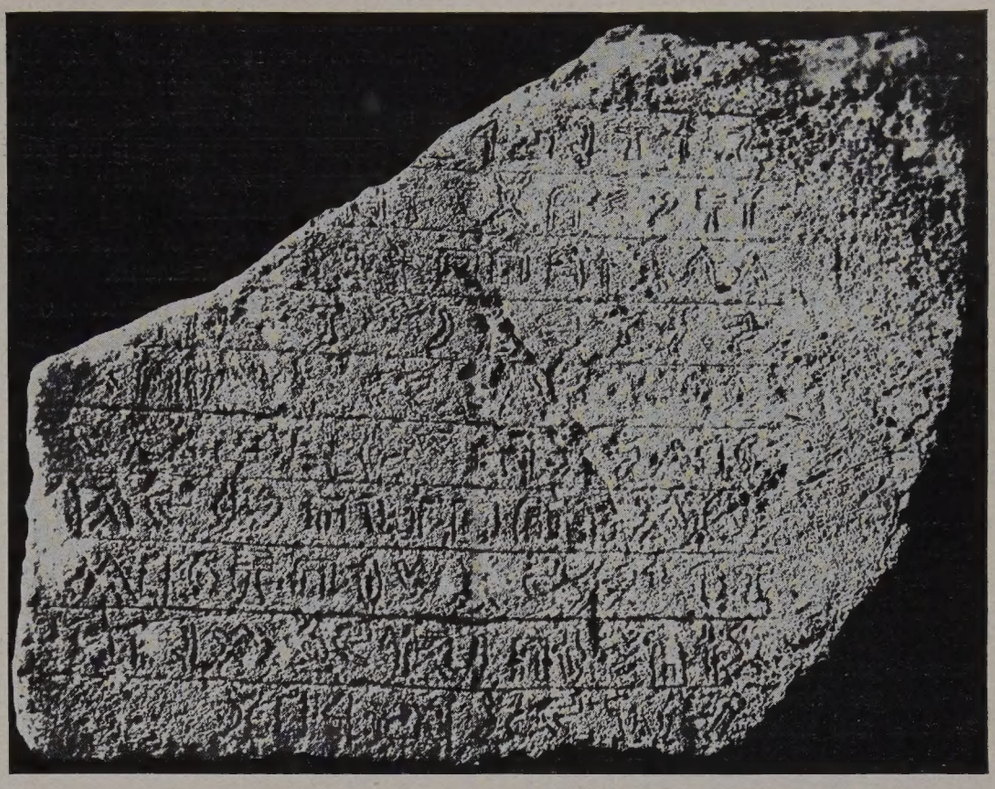
"The development of gas masks suitable for voice transmission for use with optical instruments such as range finders, field glasses and periscopes is nearing completion," General Gilchrist said. "This mask has a special molded rubber face-piece and is assembled to a canister placed at the back of the head."

Medical attaches to the chemical service are at work, too, officials revealed, on a means of developing a mask which will not give the wearer the headaches experienced by so many soldiers during the last war. Army chemists stoutly assert gas warfare is the most humane type of offensive, and to prove their claims quote from World War statistics to show that gas, while it temporarily disabled an astonishing number of fighters, killed comparatively few.

"A gas casualty has about ten more chances than a high explosive or rifle casualty of coming through whole," Dr. G. A. Rankin, one of the civilian experts employed by the Government for gas experimental work, explained.

Dr. Rankin is one of a number of civilians working in government laboratories to develop chemical warfare. He and his associates have concentrated their equipment at Edgewood Arsenal, near Baltimore, and behind guarded doors are working out new methods for the chemical warfare service.

*Science News Letter, February 14, 1931*



ALMOST AN ALPHABET

***The alphabet found at Byblos containing 38 different symbols. Below is the third row of letters as a French scholar reconstructs them. Another recent discovery of ancient alphabetic writing is that found at the ruins of the Canaanite royal city of Gezer.***

ARCHAEOLOGY

# Chance Discovery Shows That Canaanites Used an Alphabet

THREE queer signs cut into a broken scrap of a pottery jar are new evidence of the antiquity of the alphabet, is the conclusion of Prof. Romain Butin, of the Catholic University of America located in Washington.

The jar fragment was found at the ruins of the Canaanite royal city of Gezer. The bit of clay is evidence that alphabet writing existed in the world as early as the nineteenth century B. C. It seems that the Canaanites, who held the Promised Land before the Children of Israel appeared to claim it, were a people who not only knew a system of writing, but had an alphabetic system.

This scrap of writing is now regarded as one of the most important archaeological discoveries made in Palestine in many years. And, strange to say, when it was discovered some months ago it was set aside with objects a thousand years younger than itself, and thought to be no older than they.

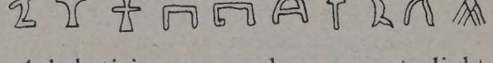
Prof. Butin saw that the letters were like the alphabetic inscriptions that have been coming to light from the Wilderness of Sinai, which lies south of Palestine.

The Sinai alphabet writings show traces of having been evolved directly from Egyptian picture writing, and thus they are looked upon as a real missing link in alphabet evolution. The question about them has been—how old are they? The fragment of pottery from Gezer makes it clear that the Sinai alphabet is older than 1600 B. C., probably as old as 1900 B. C. The method of dating the writing, Prof Butin said, was to ask three experts independently to pronounce upon the age of the pottery fragment. All three said that it belonged to the Middle Bronze Age of Palestine, which was between 2000 B. C. and 1600 B. C.

The three letters on the fragment are the oldest writing ever found in Palestine. The meaning of the letters is said to be "Children of," the rest of the inscription being broken off. The inscription was probably an ownership mark and was similar in character to the familiar title Children of Israel.

The alphabet idea was probably thought of just once, Prof. Butin believes. But after that, it was applied to different forms of script by men who sought to simplify writing.

The Sinai alphabet was one simplification. Two other evidences of the



alphabetizing process have come to light very recently. One is the alphabet found at Ras Shamra, in Syria. The other is a semi-alphabetic writing found at Byblos, in Syria.

*Science News Letter, February 14, 1931*

SEISMOLOGY

## Ship at Sea Pitched About Over Quake Epicenter

THE EARTHQUAKE that caused heavy damage and loss of life in Oaxaca, Mexico, and surrounding towns on the night of Wednesday, Jan. 14, also gave a severe shaking to a ship at sea near its epicenter. A bulletin of the Hydrographic Office of the U. S. Navy, just issued, contains a report from Capt. W. H. Wilder of the American steamer Kekoskee.

The disturbance, Capt. Wilder states, lasted about one and a quarter minutes, during which the vessel pitched, racked and strained violently. There was such a heavy, grinding sound that the master at first imagined that his ship had stranded on an uncharted rock or shoal. Soundings, however, went to 160 fathoms and failed to find bottom.

The position of the ship at the time, in latitude 15 degrees 38 minutes north, longitude 96 degrees 6 minutes west, corresponded very closely to the position of the epicenter of the Oaxaca earthquake, latitude 16 degrees north, longitude 96 degrees west, as determined by the U. S. Coast and Goedetic Survey from data collected by Science Service.

This epicenter position was announced by Science Service, with the prediction that heavy damage would be reported from the Oaxaca region, while news dispatches were still concerned wholly with disturbances in Mexico City, which was remote from the principal scene of earthquake action. Several hours later, repaired telegraph lines confirmed the prediction. Further confirmation of the epicenter is now furnished by the report of Capt. Wilder.

*Science News Letter, February 14, 1931*

NUTRITION

## Intoxicating Drink Found To Save Race in Mexico

PULQUE, a Mexican drink inherited from prehistoric times and for which prohibition has been urged because it is blamed for the degeneracy of the Indian, may have been keeping him alive this long, a nutritional investigation seems to indicate.

Under the direction of Dr. José Zozaya, director of the Hygienic Institute of Mexico City, studies are being made for the first time on foodstuffs used by the native population. The first material thus investigated was pulque, and the results show that this slightly intoxicating liquor is extremely rich in yeasts. The native diet on the central plateau where pulque is the great drink, consists mainly of chili, beans, and corn, an unbalanced and incomplete ration in the light of what is now known of man's requirements.

Because of such a diet, rickets should be the prevalent disease of that region, but curiously enough, crooked bones are rare, and in spite of extremely unhygienic living conditions those that survive the infectious diseases of childhood grow surprisingly strong. The strong back of the pulque-drinker supplies most of the transportation in rural Mexico. Indian babies are often weaned on pulque, and as soon as they can walk they consume chili that would make a strong man cry.

What part "alpine" sunlight on the high Mexican plateau plays in the prevention of Indian rickets is not known, But Dr. Zozaya is convinced that pulque, with its plentiful yeasts rich in the vitamins and amino acids that corn and beans lack, has probably served to keep the race alive, rather than killing it off. He finds that in spite of the very bad water supply of many pulque haciendas, intestinal infections there are rare.

Pulque is the fermented juice of the maguey, or century plant, which with the cactus is the most characteristic object on the Mexican landscape of the central plateau. Because of its undoubted nutritional value, as well as the enormous capital invested in the industry, Dr. Zozaya believes a hygienic control of the industry is what is indicated at this time, rather than prohibition.

*Science News Letter, February 14, 1931*

ARCHAEOLOGY

## Museum Publishes Rare Document on Maya

A HITHERTO unstudied document, telling about the customs of the Mayan Indians and the geography of their tropical homeland in Yucatan, is an important historical work now being published by the Mérida museum, Yucatan.

The original document was discovered only recently in the archives of the British Museum. It was written in 1636 by Francisco Cárdenas Valencia, and consists of a report describing the Spanish campaign to convert the natives of the Mayan country to Christianity.

*Science News Letter, February 14, 1931*

# IN SCIEN

ARCHAEOLOGY

## Soldiers Find Gods Of Aztec Days

ROAD BUILDING soldiers excavating in the dry lake bottom between Mexico City and Texcoco have come upon ruins of an Aztec wall and three red volcanic-rock idols of Quetzalcoatl, feathered snake god of prehistoric America. One idol represents him as the Wind God, with his snout extended, blowing or snorting.

In addition to these Aztec remains, the site is also rich in vestiges of a much older civilization, for "archaic" housewives cast down enormous quantities of broken kitchen ware from the top of the Penon, small sleeping volcano, which was then a rocky island in the Texcocan lake.

*Science News Letter, February 14, 1931*

ZOOLOGY

## Speed Record for Coyotes Broken In Yellowstone

A YELLOWSTONE coyote has broken the speed record for coyotes set up by Ernest Thompson Seton in his "Life Histories of Northern Animals." According to Mr. Seton, the best speed for a northern coyote was 24 miles an hour.

The Yellowstone animal, officially paced, kept up a speed of from 25 to 35 miles an hour for a distance of 1.6 miles—a new record for coyotes to shoot at.

Joseph Joffe, assistant to the superintendent of Yellowstone National Park, tells the story. While en route by automobile to the buffalo ranch recently he encountered two coyotes in the road. Upon seeing the car they separated, as always seems to be their custom, one going to the left over a game trail and the other to the right, along the road.

Mr. Joffe immediately picked up speed and followed the one in the road. Mrs. Joffe, who watched the speedometer, states that at no time did it record less than 25 miles an hour, and that the maximum was 35 miles.

*Science News Letter, February 14, 1931*

# E FIELDS

PUBLIC HEALTH

## Influenza Has Reached Peak In Some Cities

THE influenza epidemic has reached its peak in the eastern part of the United States, it appears from reports received at the U. S. Public Health Service in Washington. A total of 8,362 cases have been reported for one week. This does not include a report from South Carolina, where the epidemic has been particularly severe, and it is expected that the final total will be about 1,000 higher.

While the later reports showed a continued increase, a decrease is expected soon at least in the eastern half of the country. In New York City, where the disease has been strikingly prevalent, the peak was reached the week of Jan. 24, the third week of the epidemic there. The city's report for the week of Jan. 31 showed a drop of 646 cases.

From this it may be taken that the peak of this particular epidemic will be reached during its third week. For the states which have been reporting high numbers of cases so far, the last week of January was the third week of the epidemic. Further west, where the epidemic has not yet appeared, the peak will come later.

*Science News Letter, February 14, 1931*

PHYSICS

## Ranger Causes Static In Yellowstone Canyon

AN OUTSTRETCHED hand, pointing out an interesting view in the Grand Canyon of the Yellowstone, recently caused the sound of static electricity.

E. N. Jones, head ranger-naturalist of the park, with Mrs. Jones, sat at Inspiration Point on the Canyon Rim. Practically the entire sky was over-cast and a small thunder storm was brewing in the region to the north and west of the canyon.

During the course of the conversation, Ranger Jones stretched out his hand to point out the older portion of the canyon on the down-stream side from Inspiration Point, and the sound of static electricity was heard, as though it were in the course of jumping from pole to pole of a sparking machine. Mr. Jones closed his hand tightly and the sound stopped. When he stretched out his fingers the sound again was heard. Further experiments gave the same results. Mrs. Jones also was able to cause these sounds.

Electric Peak, one of the oldest mountains in the Gallatin Range, was so named by one of the early exploring parties because of electrical disturbances they encountered.

*Science News Letter, February 14, 1931*

CHEMISTRY-PHOTOGRAPHY

## New Movie Film is Better For Use With Talkies

FROM the astronomical observatory to the movie lot a new triple-fast photographic emulsion has come to make motion picture production cheaper and more flexible.

The motion picture film introduced to the profession last week is described by the Eastman Kodak Company as "the greatest advance in motion picture materials since the introduction of panchromatic film eighteen years ago." Its sensitive emulsion is very closely related to one prepared for astronomical photography which has been used to reduce the time required for making exposures through large telescopes. An improvement in the photographic plates used is just as effective in this case as though the telescope itself were increased in size. The emulsion of the super-speed panchromatic plates produced for newspaper photographers is also very similar to the new movie emulsion.

When the movies went talkie it was necessary to banish the familiar arc lamps on account of their noise. Large incandescent lamps are used. These are rich in red light which does not register effectively on ordinary movie negative. The new supersensitive film is affected by both red and green light to a much greater extent than previous film.

Camera men will now be able to "spot down" their lenses and get increased depth of focus which will allow the actors to move around with less fear of getting out of focus. Or they will be able to use less light and save money.

*Science News Letter, February 14, 1931*

ICHTHYOLOGY

## Fish Turns Cut Throat Into an Extra Mouth

A FISH that apparently had its throat cut, or suffered some similarly bad accident, early in life and yet was not discouraged is the remarkable find described by Dr. E. W. Gudger of the American Museum of Natural History. The fish, a yellow perch now preserved in the Erie, Pa., Public Museum, simply turned the wound into a second mouth opening directly under the first one, and "carried on."

This second mouth had the disadvantage of having no closing muscles, so that it remained permanently open. Nevertheless the fish made use of it without any doubt, for it was hooked in this second mouth when it was caught.

Dr. Gudger describes several other similar cases that have been recorded. The earliest of these was in 1810, but the others are all of comparatively recent date. In all cases the second mouth seems to have been established as the result of accident.

*Science News Letter, February 14, 1931*

SEISMOLOGY

## New Zealand Earthquake Possibly Under Sea Bottom

THE EPICENTER of the destructive earthquake that wrecked towns and claimed many lives in New Zealand was very near to Napier, the locality hardest hit. Scientists of the U. S. Coast and Geodetic Survey, working with data supplied by seven seismological stations through Science Service, located the point of greatest motion at approximately 177 degrees east longitude and 39 degrees south latitude.

It is thought possible that the earthquake centered beneath the sea bottom just off shore, because of the tidal waves that added to the misery of the devastated towns. Such waves usually start from earthquakes of submarine origin.

The stations reporting were those of the U. S. Coast and Geodetic Survey at Honolulu, T. H., and Tucson, Ariz., the Philippine Weather Bureau at Manila, P. I., the Dominion Meteorological Service at Victoria, B. C., the Dominion Observatory at Ottawa, Ont., Georgetown University at Washington, D. C., and Canisius College at Buffalo, N. Y.

*Science News Letter, February 14, 1931*

SEISMOLOGY-ENGINEERING

# Chained House Stands While Others Fall in Quake

## Careful Study and Application of Knowledge to New Buildings Seen as Only Earthquake Damage Preventive

THOUGH earthquakes cannot be prevented, or even successfully predicted, full and careful study of their effects will help prevent damage when they do occur. This was the thought presented by Capt. N. H. Heck, chief of the division of terrestrial magnetism and seismology of the U. S. Coast and Geodetic Survey, in a radio talk under Science Service auspices through stations of the Columbia Broadcasting System.

"Last July there was a severe earthquake in southern Italy which caused much damage to property and loss of life," he stated. "Earthquakes and volcanoes have long been associated in the public mind, and it is, therefore, of special interest that Dr. Malladra, director of the Vesuvius Observatory, states that while his building was badly rocked by the earthquake and was saved from destruction only because the various parts were chained together, there was no volcanic activity at the time of the earthquake.

"The destruction caused by this earthquake has a possible lesson for us even though the conditions are quite different. The buildings have thick walls of field stones and poor mortar and thick roofs, the thickness being intended to keep out the heat. Timber is scarce and the roof supports are weak. There is, therefore, the combination of great weight and lack of strength, an ideal arrangement for producing maximum earthquake damage. Unfortunately, owing to poverty and other reasons, the destroyed houses are rebuilt in exactly the same way and will fall in the same manner in the next earthquake. . . .

"A broad gauge attack on the earthquake problem is now going on in this country, Japan, and other parts of the earth. It includes practically every field of interest from interpretation of seismograph records to design of dams and other structures. With all its comprehensiveness there is one serious gap—we do not know exactly what goes on in the central region of severe earthquake. . . ."

Captain Heck told how artificial earthquakes were helping to solve some of the problems.

"At best it will be some time before the desired information is in the hands of the structural engineer, and rightly, the engineer is not waiting for it," he said. "He is designing large buildings, bridges, and dams as best he can for earthquake stress. There has been going on at Stanford University for several years investigation by means of a shaking platform of stresses of structures under movements resembling earthquakes, and also studies of foundation materials subjected to similar vibrations. The platform, a heavy, steel structure, is set into vibration by suitable apparatus and, except in the vertical direction, is capable of closely imitating earthquake motions, provided it is known what these are. An immediate use of new information along this line is therefore indicated. Other engineering studies are being made and the elaborate work in Japan along these lines is being followed."

*Science News Letter, February 14, 1931*

PSYCHOLOGY

## Psychology Helps Business Understand Human Element

THE importance of studying the psychological foundations of business and industry, as well as its economic and technical supports, was emphasized by Prof. Morris S. Viteles, of the University of Pennsylvania, in an address at the New York Academy of Medicine.

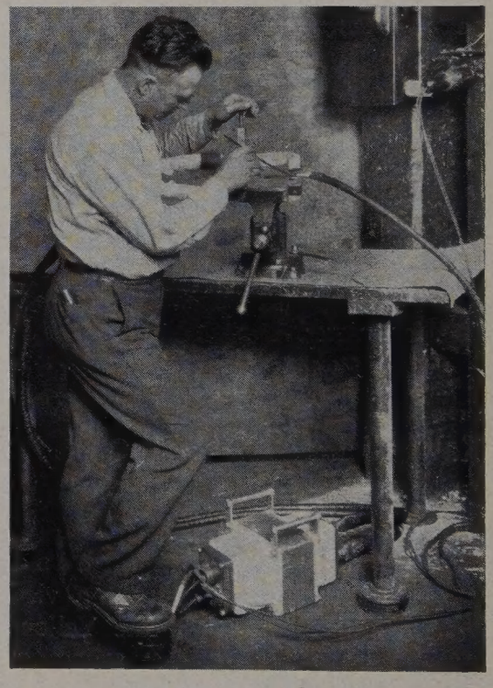
As examples of the practical ways by which psychology can aid executives to understand human element in their business, Prof. Viteles cited psychological tests used for the selection of workers, psychological methods of training workers, an exact knowledge of the effect of working conditions such as monotony on employees, reduction of fatigue, and the promotion of safety among workers.

The use of psychological tests in the employment of substation operators of the Philadelphia Electric Company resulted in the reduction of operation mistakes as much as 43 per cent., Prof. Viteles said.

"An example of the application of the clinical method in the re-adjustment of workers is to be found in the study of accident-prone street car and taxicab operators," he added. "An analysis of the conditions producing proneness to accidents has made it possible to reduce the number of accidents in the case of a number of transportation companies, and definitely to promote the happiness and welfare of the individual operator.

"There is another example of the same approach in the analysis of the factors differentiating the cab driver capable of earning high salaries on a commission basis and those who fail to earn satisfactory commissions. An analysis of these factors in a clinical study of individual drivers made it possible to produce real habilitation on the part of many drivers who without much study might have been thrown on the industrial scrap heap."

*Science News Letter, February 14, 1931*



SILVER FOR LEAD

***This is a substitution now being made as brazing takes the place of soldering in the electrical industry. A brazed joint is preferred to a soldered connection, Samuel Martin, Jr., of the General Electric Company told the recent meeting of the American Institute of Electrical Engineers, because it is stronger and cheaper, has greater conductivity and higher heat resisting qualities, and takes less time to make.***

MATHEMATICS-PHYSICS

# The Special Theory of Relativity

## "A Classic of Science"

### Einstein's First Epoch-Making Paper Shows That Changes In the Speed of an Observer Can Stretch or Contract Time

*ZUR ELEKTRODYNAMIK BEWEGTER KOERPER; von A. Einstein, In Annalen der Physik, vol. 17, 1905. Translated for the* SCIENCE NEWS LETTER.

IT IS well known that Maxwell's electrodynamics—as it tends to be interpreted at present—in its application to moving bodies, leads to inconsistencies which do not seem to be inherent in the phenomena. They appear, for example, in the reciprocal electrodynamic action between a magnet and a conductor. The observable phenomenon here depends only upon the relative motion of conductor and magnet, but, according to the usual idea, two cases, with the one or the other of these bodies as the moving one, are sharply differentiated from each other. When the magnet moves, for example, and the conductor is at rest, there arises in the neighborhood of the magnet an electric field of known strength which produces a current in the place where part of the conductor is. But when the magnet is at rest and the conductor moves, there arises in the neighborhood of the magnet no electric field, but instead, in the conductor, an electromotive force which does not, in itself, correspond to energy, but which—presupposing equality of the relative motion in the two cases considered—gives rise to an electric current of the same strength and the same direction as the electric field in the first case.

Examples of similar kind, as well as the futile attempts to establish motion of the earth relative to the "medium of light," lead to the supposition that, not only in mechanics but also in electrodynamics, no essentials of the phenomena correspond to the surmise of absolute rest; rather, on the other hand, for all systems of co-ordinates for which mechanical equations hold good, the same electrodynamic and optical laws apply as already proved for quantities of the first order. We will take this surmise (whose substance will hereafter be called the "Principle of Relativity") as a postulate, and also add to it the only apparently contradictory hypothesis that light is always transmitted in empty space with a definite velocity $V$ independent of the state of motion of the emitting body. These two postulates together suffice to base a simple, consistent electrodynamics of moving bodies, making use of Maxwell's theory of bodies at rest. The introduction of a "light ether" will prove unnecessary according to the viewpoint which we develop insofar as there is introduced neither absolute space at rest and endowed with particular properties nor a velocity vector associated with a point of empty space in which electromagnetic processes take place.

The theory which will be developed is limited—like all other electrodynamics—to the kinematics of rigid bodies, since the statements of every theory have to do with the relation between rigid bodies (co-ordinate systems), clocks and electromagnetic processes. The fact that people have not had sufficient regard for these circumstances is at the root of the difficulties with which the electrodynamics of moving systems at present has to contend.

#### Simultaneity

Let us assume a co-ordinate system in which the equations of Newtonian mechanics are valid. We shall call this co-ordinate system, for the sake of distinguishing it in our speech from later co-ordinate systems, and for precision of definition, the resting system. If a material point is at rest relative to this co-ordinate system, its position relative to it according to a definite scale of measurement can be determined by using the methods of Euclidean geometry, and can be expressed in Cartesian co-ordinates.

If we wish to describe the *motion* of a material point, we will give the values of its co-ordinates as functions of time. We must keep it very carefully in mind that a physical meaning can be ascribed to such a mathematical description only if one has clearly comprehended beforehand what is here understood by the word "time." We must bear in mind that all our judgments in which time plays a part are always judgments about *simultaneous occurrences.* If I, for example, say: "The train arrives at 7 o'clock," it means just about this: "The short hand of my watch pointing to 7 and the arrival of the train are simultaneous events."[1]

It might seem that all the difficulties which cling to the definition of "time" could be overcome by putting in place of time, "the position of the short hand of my clock." Such a definition actually is sufficient, if it is a question of time defined exclusively for the place at which the clock stands; the definition however no longer suffices when we link together in a temporal relation a series of events occurring in different places, or—which comes to the same thing—to give temporal values to occurrences at places which are distant from the clock.

We could of course content ourselves with giving temporal evaluation to events if an observer with a clock who found himself at the origin of co-ordinates should ascribe to each event the position of the clock hand when the light ray, coming to him through

[1] The inaccuracy which is inherent in the conception of simultaneity of two events in (approximately) the same place, and must at the same time be bridged over by an abstraction, will not be discussed here.

**The Value of Food**

**in preserving health and youth**

**is told by**

**Dr. E. V. McCollum**

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**151ST CLASSIC OF SCIENCE**

empty space, bearing witness of the event reaches him. Such an ascription, however, brings with it the difficulty that it is not independent of the standpoint of the observer who has the clock, as we know by experience. We arrive at a much more practical point of view through the following consideration.

If a clock is placed at point $A$ in space, an observer stationed at $A$ can evaluate temporally the events in the immediate vicinity of $A$ by finding the positions of the clock hands simultaneous with these events. If a clock is also situated at point $B$ in space—we will add, "a clock of precisely the same properties as that at $A$"—the evaluation of events in the vicinity of $B$ by an observer who is at $B$ is also possible. It is not, however, possible without further explanation to compare as to time an event at $A$ with an event at $B$; we have so far only an "$A$-time" and a "$B$-time," but no common "time" defined for $A$ and $B$. This latter time can now be defined, if we will settle *by definition* that the "time" which light takes to travel from $A$ to $B$ is equal to the "time" which it takes to travel from $B$ to $A$. That is, a ray of light starting out from $A$ toward $B$ at "$A$-time" $t_A$ is reflected at "$B$-time" $t_B$ from $B$ to $A$, and comes back to $A$ at "$A$-time" $t'_A$. The two clocks run synchronously, according to definition, if

$$t_B - t_A = t'_A - t_B.$$

We assume that this definition of synchronism may be stated in a manner free from contradictions, and in fact that for as many points as you wish the general relations are:

1. If the clock in $B$ runs synchronously with the clock in $A$, the clock in $A$ runs synchronously with the clock in $B$.

2. If the clock in $A$ runs exactly as the clock in $B$ and also as the clock in $C$, then the clocks in $B$ and $C$ run synchronously relative to each other.

We have thus by the use of hypothetical physical experiments defined what is to be understood by clocks at rest running synchronously at different places, and by it have won an evident definition of "simultaneous" and of "time." The "time" of an event is the simultaneous indication of a clock at rest, at the place of the event, which runs synchronously with a given clock at rest, and indeed for all determinations of time with the same clock.

We assume in accordance with experience that the quantity

$$\frac{2AB}{t'_A - t_A} = V$$

(the velocity of light in empty space) is a universal constant.

It is evident that we have defined time of clocks at rest within a resting system; we will call time so defined, because it belongs to a resting system, "the time of a system at rest."

### Relativity of Lengths and Time

The following considerations are based on the principle of relativity and on the principle of constancy of the velocity of light, which two principles we define as follows:

1. If the conditions of physical systems are expressed with reference to two different co-ordinate systems moving relative to each other with uniform velocity of translation, the laws according to which the system changes condition will be the same for either.

2. Every ray of light moves in a resting co-ordinate system with the definite velocity $V$, regardless of whether the ray of light is emitted by a resting or a moving body. Hence

$$\text{Velocity} = \frac{\text{path of light}}{\text{duration of time}}$$

in which "duration of time" is to be understood in the sense of the definition in Article 1.

Let there be a rigid rod at rest; let it be measured with a likewise resting measure of length $l$. Let us now imagine the axis of the rod as placed on the X-axis of a resting co-ordinate system, and then given a uniform motion of parallel translation (with uniform velocity $v$) along the X-axis in the direction of increasing $x$. We shall inquire as to the length of the *moving* rod, which we shall think of as determined by the following two operations:

a) The observer himself moves, together with the previously mentioned measuring rod, with the rod to be measured, and determines the length of the staff directly by laying the measuring rod along it, just as he did when the rod to be measured, the observer and the measuring rod were at rest.

b) By means of synchronous clocks

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set up in the resting system, according to Article 1, the observer determines at what points the beginning and the end of the rod to be measured are at a given instant $t$. The distance between these two points, measured with the same measuring rod used before, but in this case at rest, is also a length, which may be considered as the "length of the staff."

According to the principle of relativity the length found by operation a), which we will call "the length of the rod in the moving system," must be the same as the length $l$ of the rod at rest.

The length which we find by operation b), which we will call "the length of the (moving) rod in the resting system," we will determine, making use of our two principles, and we will find that it is different from $l$.

The generally accepted kinematics tacitly assumes that the lengths determined by the two operations described will be exactly equal to each other, or, in other words, that a moving rigid body at the instant $t$ could be replaced in all its geometric relations by the *same body* when it *rests* in a given position.

We consider further the two clocks ($A$ and $B$) located at the ends of the rod, which are synchronous with the clocks of the resting system, that is, their reading corresponds to "the time of the resting system" at the places where they happen to be at that time; these clocks are therefore "synchronous with the resting system."

We assume further that with each clock there is an observer who moves with it, and that these observers apply to both clocks the criterion for the synchronous running of two clocks which we set up in Article 1. Let a ray of light leave $A$ at the time $t_A$,[2] let it be reflected at $B$ at the time $t_B$, and return to $A$ at the time $t'_A$. Taking account of the principle of constancy of the velocity of light we find:

$$t_A - t_B = \frac{r_{AB}}{V - v}$$

and

$$t'_A - t_B = \frac{r_{AB}}{V + v}$$

where $r_{AB}$ denotes the length of the moving rod measured in the resting system. The observers moving with the moving rod would therefore find that the two clocks were not running synchronously, but the observers in the resting system would declare that the clocks were running in synchronism.

We see therefore that we are not able to ascribe to the concept of simultaneity any *absolute* meaning, but that two events which, viewed from one co-ordinate system, are simultaneous, viewed from another co-ordinate system in motion relative to the first can no longer be considered simultaneous events.

*Science News Letter, February 14, 1931*

[2] Time here means "time of the resting system" and at the same time "position of the hand of the moving clock which is at the same place that we are discussing."

PSYCHOLOGY

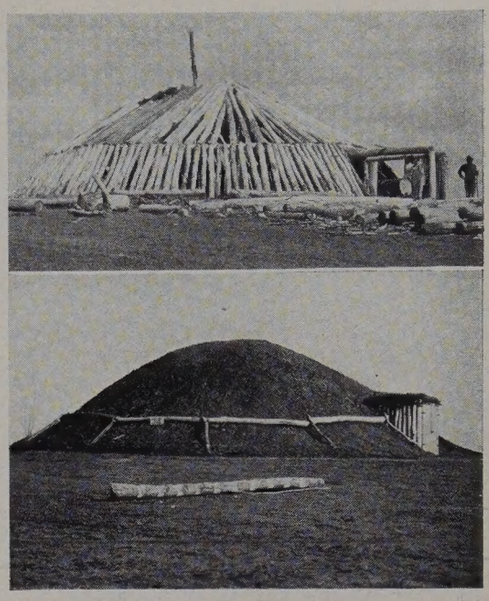
## The Psychology Of Adolescence

THOSE whose interest in last week's classic causes them to desire to read more of G. Stanley Hall's discussion of adolescence will find that "Adolescence" is published by D. Appleton & Company, New York, and that this book has gone through many editions since its original publication in 1904.

We appreciate copyright permission from the publishers to reprint this classic. (See SCIENCE NEWS LETTER, Feb. 7, 1931.)

*Science News Letter, February 14, 1931*

There are a number of kinds of so-called cow trees which yield milk, a Field Museum technologist states.



**THE MAKING OF A MONUMENT**

**A unique monument to the memory of three Indian tribes has been erected on the grounds of the State Capitol at Bismark, N. D. The monument is a faithful reproduction of the earth lodges in which the Arikara, Mandan, and Hidatsu tribes lived before the coming of white men. The suggestion that the Indian house would be an appropriate historic state monument was made by Dr. Melvin R. Gilmore, formerly in charge of the State Historical Society. The project was started by the society last September, under the direction of Russell Reid, acting superintendent. The earth lodge is circular.**

MEDICINE

# Men Brave Death to Help Solve Monkey Disease Mystery

THREE brave men have again offered their lives to help science fight disease. Fortunately they escaped death, modern methods of treatment having cured the disease which they voluntarily contracted for the sake of their fellow men.

They made their heroic contribution to the advancement of science at the Panama laboratory of the Gorgas Memorial Institute. The disease they acquired was relapsing fever, in itself no trifling ailment. But when the three men submitted to the experiment, they had no certain knowledge that the disease they were risking was one known to science and for which science had found fairly effective methods of treatment.

The problem which the three volunteers helped to solve was one of those scientific mysteries the account of which, even in the technical report of the Institute, reads like a good detective story.

The wild monkeys of Panama have been the subject of study at the laboratory for some time. In the blood of one of these animals, a juvenile squirrel monkey commonly known as a marmoset, a new disease germ was found. This germ belonged to the spirochete family. Members of this family cause various forms of relapsing fever, syphilis, and other diseases.

"This particular animal had spent three nights on its way into the laboratory in native villages that are endemic centers for relapsing fever, a spirochetal disease," the scientist detectives found. "We first concluded that

the monkey had accidentally acquired human relapsing fever."

Because this would mean that this type of monkey could be a reservoir for the disease, from which humans might acquire it, the scientists decided to investigate. A jungle expedition in an area out of contact with human beings yielded two animals which had been infected naturally in the jungle. Back in the laboratory, the disease transferred easily to practically all laboratory animals and monkeys. Most of them recovered quickly from it, but the infant and juvenile squirrel monkeys showed a high death rate.

"We considered this of such importance that another call for human volunteers was made," Dr. Herbert C. Clark, director of the laboratory, reported.

Fear of the virulence of the organism limited the human experiment to one man at first. Proof that the disease was transferred to him from the monkey was made by finding the spirochete in his blood. After he had responded well to treatment for relapsing fever, the other volunteers were used.

Human ticks native to the locality were next fed on monkeys acutely ill with the disease. They later fed on the second human volunteer to whom they transferred the disease. The progeny from the eggs of these ticks were then fed on the third volunteer, but without success in the transference of the disease.

Further links in the chain of evidence needed to prove the identity of the mysterious monkey disease are now being taken. However, the investigators feel they have progressed far enough to say that the disease is either identical to or very closely related to human relapsing fever. Meanwhile, the three brave volunteers are entirely recovered. To avoid publicity, their names are withheld and they themselves are once more engaged at their regular occupations.

*Science News Letter, February 14, 1931*

ASTRONOMY

# Eros, Unlike Large Planets, Has Elliptical Outline

EROS, the tiny planet that recently paid a visit to the near neighborhood of the earth, has been seen as a solid object for the first time. Hitherto it has been visible only as a minute pinpoint of light, without any measurable diameter. But two astronomers at Union Observatory, Johannesburg, South Africa, have turned the powerful instruments there on the asteroid, now so far south that northern-hemisphere observers can no longer see it very clearly, and they have been able to see that the asteroid is not a spheroid, like the larger planets, but is an ellipsoid, considerably longer in one diameter than in the other.

This information was cabled to Science Service by the international clearing house for astronomical information at Copenhagen, and interpreted by Dr. Harlow Shapley of the Harvard College Observatory, Cambridge, Mass., and by William M. Browne of the U. S. Naval Observatory.

Eros has been observed visually to be elongated about 29 to 25 miles in length and from 8 to 10 miles in average width, according to preliminary interpretations of observations of the visiting planet, when only about 16,000,000 miles from the earth, it was announced at the Harvard Observatory last week.

The astronomers have arrived at their conclusions about the size and shape of Eros through observations of the period of variation in the range of intensity of light which comes from that planet. The latest observations settle a long controversy as to whether the planet was elongated, or merely so pitted and spotted as to cause variations. The conclusion that it is elongated was arrived at from seeing that it has four variations in a period of 5 hours, 16 minutes and 12.94 seconds. It is explained that as one side is turned towards the earth the intensity increases, then falls as one end turns toward the earth, increases as the other side comes into view, and falls as the other end appears.

The observations at Johannesburg were made with a 26-inch aperture refracting visual telescope and not by photography. Other observatories in that part of the world reported to Copenhagen.

*Science News Letter, February 14, 1931*

BOTANY

## *Nature Ramblings*

*By* FRANK THONE

### Wintergreen

ONE of the most attractive of the lesser plants that stays green all winter long is the wintergreen, better known by flavor than by sight to many of us. However, a walk in the richer woods, in a region where the soil has a tendency to go acid, will enable us to make its acquaintance.

It is really a vine, but its main stem runs along just under the surface of the ground, so that it appears to us like a tangle of tiny, erect shrubs, with the small, stiff oval leaves characteristic of the members of the heath family, to which it belongs, and attractive bright red berries. The bunched leaves are rich with the aromatic flavor which we have learned to associate with the name of the plant.

There are approximately one hundred species in the wintergreen genus, all but one of which are natives of eastern Asia. All of the wintergreen plants that grow in America belong to the same species, and it is only this species that furnishes the wintergreen flavor.

In addition to its commercial and culinary importance, the American species has also some interest as a monument in the history of nature study on this continent. It is the "type species" of the wintergreen genus, whose botanical name is *Gaultheria*. The name was given in honor of a pioneer naturalist, one Hughes Gaultier, who was court physician at Quebec, in the middle of the eighteenth century.

*Science News Letter, February 14, 1931*

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White-shelled eggs are produced by chickens of Mediterranean origin, such as Leghorn, Minorca, and Blue Andalusian; whereas brown-shelled eggs are produced by American developed breeds, such as Plymouth Rock, Rhode Island Red, and Wyandotte.

# • First Glances at New Books

See also Page 112

**Meteorology**

CLIMATE—W. G. Kendrew—*Oxford Press,* 320 p., $5. Those particularly interested in meteorology will wish to add this book to their libraries. Written from a British standpoint, it does not contain as many American examples as it might, but its consideration of insolation and temperature, pressure and winds, humidity, rainfall, evaporation, clouds, thunderstorms, sunshine and cloud, fog, etc., to quote a few chapter headings, is readable.

*Science News Letter, February 14, 1931*

**Zoology**

(I) BIG GAME PHOTOGRAPHS FROM THE TIMES; (II) ELEPHANTS AND OTHER BIG GAME PHOTOGRAPHS FROM THE TIMES—Marcuswell Maxwell—*Times Publishing Co.,* 5s. These are two superb collections of animal photographs taken in Africa and published first in the *London Times.* One book goes in rather heavily for lions, the other for elephants; but both have good assortments of other pictures as well.

*Science News Letter, February 14, 1931*

**Aviation**

INTERNATIONAL CONTROL OF AVIATION—Kenneth W. Colegrove—*World Peace Foundation,* 234 p., $2.50. As aviation spreads throughout the world, there arises the necessity of laws and regulations to govern the aerial contacts of the various nations. The status of today's rivalry for the control of the international air routes is given in this volume.

*Science News Letter, February 14, 1931*

**Physics**

HANDBOOK FOR PROJECTIONISTS—Installation and Service Department—*RCA Photophone,* 214 p., $2. Now that the projection of motion pictures is complicated with the addition of sound, the operators in the booths above the heads of the audience need such a handbook as this to allow them to understand the machines they are operating.

*Science News Letter, February 14, 1931*

**History**

GIANTS OF THE OLD WEST—Frederick R. Bechdolt—*Century,* 245 p., $2. Adventure tales of men who won the West.

*Science News Letter, February 14, 1931*

**Chemistry**

EIGHTH REPORT OF THE COMMITTEE ON CONTACT CATALYSIS—J. C. W. Frazer—*National Research Council,* 51 p., 50c. Of great industrial importance is the chemical phenomenon described in this report. The making of wood alcohol from carbon monoxide, the synthesis of higher alcohols and the hydrogenation of coal and many other chemical processes are brought about by contact catalysis.

*Science News Letter, February 14, 1931*

**General Science**

A HISTORY OF SCIENCE—William Cecil Dampier Dampier-Whetham—*Macmillan,* 514 p., $6. This is a present day classic in the humanizing of the history of science. Within the covers of a single volume, there is told with clarity and accuracy the growth of the structure of modern science that is, as the author says, "perhaps the greatest triumph of the human mind."

*Science News Letter, February 14, 1931*

**Geography**

ASHWELL'S WORLD ROUTES 1930—Edited by Kurt G. W. Luedecke—*Thomas Ashwell & Co.,* 848 p., $7.50. Globetrotters will welcome this new annual international travel guide, which with a minimum of effort tells how to get from where you are to any other portion of the globe.

*Science News Letter, February 14, 1931*

**Horticulture**

AZALEAS AND CAMELLIAS—H. H. Hume—*Macmillan,* 90 p., $1.50. The romantic gardens of the Old South, beautiful beyond all telling in the warm days of spring, depend for much of their charm on these two genera. This little book tells how to select, plant and care for them.

*Science News Letter, February 14, 1931*

**Geography-Sociology**

CHINA—Edited by Henry F. James—*American Academy of Political and Social Science,* 431 p., $2. An admirable review of the country of the world's oldest civilization, with each chapter written by an expert.

*Science News Letter, February 14, 1931*

**Philosophy**

LIFE AFTER DEATH—Arthur H. Compton, Shailer Mathews and Charles W. Gilkey—*American Institute of Sacred Literature,* 45 p., 2c each, $1.50 for hundred. Scientist, theologist and minister express their opinions.

*Science News Letter, February 14, 1931*

**Zoology-Geography**

THE LONG TREK—Richard L. Sutton—*Mosby Co.,* 347 p., $5. The story of the hunting travels of an American physician and his son.

*Science News Letter, February 14, 1931*

**Geology-Geography**

WORLD MINERALS AND WORLD POLITICS — C. K. Leith — *Whittlesey House,* 213 p., $2. Minerals play such an important part in international affairs that such a study of the world's mineral resources as contained in this volume should interest industrialists and statesmen as well as geologists and the users of mineral products. The practical importance of the world distribution of minerals was emphasized by the World War. Prof. Leith discusses the past and present situation and also looks into the future.

*Science News Letter, February 14, 1931*

**Speech**

PRONUNCIATION — Thorleif Larsen and Francis C. Walker—*Oxford Press,* 198 p., $2.50. First aid to radio announcers and speakers. Despite its Oxford imprint, modern American usage is given in addition to the brand of pronunciation current in Great Britain. The authors had the collaboration of two contemporary investigators, one an American, the other an Englishman.

*Science News Letter, February 14, 1931*

**Astronomy**

OTHER WORLDS THAN THIS—Elena Fontany—*Rockwell,* 112 p., $1.25. Better than fairy tales is this book for junior reading, because it is true. May it cause youngsters of this generation to aspire to be astronomers of the next, whether or not they achieve their childhood ambition.

*Science News Letter, February 14, 1931*

**Physical Geography**

HOW THE WORLD IS CHANGING—Edith Heal—*T. S. Rockwell,* 112 p., $1.25. The main facts of earth science, very simply stated and printed in large type, so that children of the lower grades can read and understand them. Well illustrated with sketches by Terry Smith.

*Science News Letter, February 14, 1931*

**Power-Economics**

SOURCES OF COAL AND TYPES OF STOKERS AND BURNERS USED BY ELECTRIC PUBLIC UTILITY POWER PLANTS —William Harvey Young—*Brookings Institute,* 79 p., 50c. To remedy an almost complete lack of information on coal distribution, the United States Geological Survey made a study of the sources of the coal used by public utility companies. This pamphlet gives the detailed statistics which will be of value in considerations of various phases of our fuel situation.

*Science News Letter, February 14, 1931*

# First Glances at New Books

See also Page 111

**Exploration**

ANDREE'S STORY—Translated by Edward Adams-Ray—*Viking Press,* 389 p., $5.

ANDREE—George Palmer Putnam—*Brewer and Warren,* 239 p., $2.50. The record of the daring pioneer flight into the Arctic is the subject of these two volumes. That published by the Viking Press contains the diaries of the explorers and other official material discovered at the last camp of Andrée, Strindberg, and Fraenkel on White Island. There are twelve photographs actually taken by the Andrée party which were successfully developed after the films had lain in the ice for thirty-three years. The book by George Palmer Putnam is the record of tragic adventure as it could be told before the deciphering of the diaries found with the expedition.

*Science News Letter, February 14, 1931*

**Sanitation**

A STUDY OF THE POLLUTION AND NATURAL PURIFICATION OF THE ILLINOIS RIVER. II: THE PLANKTON AND RELATED ORGANISMS—W. C. Purdy—*Government Printing Office,* 212 p., 45c. The Illinois, which has been violated and forced to become Chicago's *cloaca maxima,* is probably the filthiest river in the world. It is therefore a classic stream for students of sanitation and drainage problems. The series of which the present study is a part will find a relatively limited but intensely interested audience.

*Science News Letter, February 14, 1931*

**Physics**

ELEMENTARY HEAT—W. F. F. Shearcroft—*Oxford Press,* 222 p., $1.25. A textbook of English origin interestingly covering one area in the usual physics course of secondary schools.

*Science News Letter, February 14, 1931*

**Astronomy-Photography**

A MANUAL OF ASTRONOMICAL PHOTOGRAPHY—Edward S. King—*Eastern Science Supply Co.,* 177 p., $3. With the exception of H. H. Waters' small and excellent, though expensive, "Astronomical Photography for Amateurs," there has been no recent book to give the amateur astronomer who is also an amateur photographer the information he needs to combine his hobbies. Prof. King, who has been with the Harvard College Observatory, chief center of astronomical photography, since 1887, is exceptionally well equipped to supply this information, thus making his book doubly welcome. He shows how interesting pictures can be made of the heavenly objects with the simplest apparatus, so his book should introduce many to this fascinating branch of both astronomy and photography.

*Science News Letter, February 14, 1931*

**Physics**

APPLICATIONS OF INTERFEROMETRY—W. Ewart Williams—*Dutton,* 104 p., 85c. The principles and application of the light phenomenon which has been used so successfully by Michelson and others in the measurement of star diameters and for other purposes is explained in this small book written by the lecturer in physics in the University of London. Advocates of the decimal system will be interested in the way the illustrations are numbered, for the figures to the left of the decimal point indicate chapters while those to the right of the decimal point indicate the number of the illustration within the chapter.

*Science News Letter, February 14, 1931*

**Evolution**

ANIMAL ECOLOGY AND EVOLUTION—Charles Elton—*Oxford Press,* 96 p., $1.50. Although ecology holds a wealth of implication for evolution, the principles and data of this discipline have never been sufficiently applied, at least by ecologists themselves. This small book makes no pretense at being exhaustive, but contents itself with presenting, in three chapters, a number of very suggestive possibilities in the study of animal numbers, animal migration, and the "real life" of animals.

*Science News Letter, February 14, 1931*

**Philosophy**

GREAT PHILOSOPHIES OF THE WORLD—C. E. M. Joad—*Jonathan Cape & Harrison Smith,* 128 p., 60c. Some famous systems of philosophy are briefly outlined for the reader seeking an introduction to the philosophers from Plato to modern times.

*Science News Letter, February 14, 1931*

**Aviation**

GLIDERS AND GLIDING—Ralph Stanton Barnaby—*Ronald Press,* 170 p., $3. America's first licensed glider pilot, who last January launched his glider from the airship Los Angeles, gives the history and technical details of this aerial sport.

*Science News Letter, February 14, 1931*

**Psychology**

THE WORLD OF THE BLIND—Pierre Villey—*Macmillan,* 403 p., $2.25. The author, who has been blind since earliest childhood, here gives a remarkable contribution to our scientific knowledge of the blind. Of particular interest are the chapters discussing how those who are blind image spatial objects and how they can appreciate works of art. The work was awarded a prize of 5,000 francs by the French Academy of Moral and Political Science.

*Science News Letter, February 14, 1931*

**Radio**

THIS THING CALLED BROADCASTING—Alfred N. Goldsmith, Austin C. Lescarboura—*Holt,* 362 p., $3.50. The rise of radio to its present state is told by an R. C. A. engineer and a leading radio writer. As a chapter of the history of the past decade, it is a useful and readable book. No index!

*Science News Letter, February 14, 1931*

**Natural History**

THE NEW NATURE STUDY—F. J. Wright—*Thornton Butterworth,* 287 p., 5s. What might be termed an advanced book in nature study, though not written over the head of the amateur. Though applicable only to conditions in Britain, this book will be useful to nature study teachers elsewhere as an example in method.

*Science News Letter, February 14, 1931*

**Nature Study**

BIRDS OF TANGLEWOOD—K. W. Baker—*Southwest Press,* 89 p., $1.75. A little book about the little folk in feathers, who lived around a house that had plenty of trees. Illustrated with sketches by Charlotte Baker.

*Science News Letter, February 14, 1931*

**Biology**

AN EXPERIMENTAL STUDY IN PRODUCTION AND COLLECTION OF SEED OYSTERS—Paul S. Galtsoff, H. F. Prythearch and H. C. McMillin—*U. S. Government Printing Office,* 76 p., 30c. Students of biology as well as commercial fisheries men will be interested in this step toward the solution of the oyster production problem.

*Science News Letter, February 14, 1931*

**Geology-Economics**

OIL—ITS CONSERVATION AND WASTE—James H. Westcott—*Beacon,* 273 p. $3. A technical and statistical consideration of the present state of the oil industry.

*Science News Letter, February 14, 1931*